REMARKS

The present application relates to, *inter alia*, an antistatic coating material.

In the Office Action of January 25, 2007, several prior art rejections were set forth with respect to claims 1 - 7 and 11 - 20 at page 2 - page 6, line 3.

Furthermore, claims 8 - 10 were rejected at page 6 of the Office Action under 35 U.S.C. § 103(a) based on U.S. Publication No. 2003/0157317 (Ito) in view of Japanese Patent No. JP 59142226 ('226).

In this Amendment, claims 1 - 7 and 11 - 20 have been canceled. Independent claim 8 has been amended to further specifically define the antistatic coating material recited therein. Lastly new dependent claims 21, 22, and 23 have been added, dependent, respectively, on claims 8, 9, and 10.

In view of the cancellation of claims 1 - 7 and 11 - 20, it is respectfully submitted that all of the rejections as set forth with respect to those claims have been rendered moot, and the rejections should now be withdrawn.

In view of the foregoing, the only rejection remaining to be addressed is the rejection noted above set forth at page 6 of the Office Action. In view of the amendment of independent claim 8, it is respectfully submitted that claim 8 and dependent claims 9 - 10 and 21 - 23, which depend directly or indirectly on claim 8, should now be allowed. The reasons for withdrawal of

the remaining rejection and allowance of remaining claims 8 - 10 and 21 - 23 are set forth below in detail.

As a method of forming an antistatic layer containing a conductive filler on an article surface, there is, for example, a method of applying an antistatic coating material containing conductive metal oxide fine particles to the article surface. However, such a coating material containing a large quantity of fine particles shows a thixotropic property, interfering with smooth coating formation, such that application to articles required to be transparent has been limited. That is, since coating had to be carried out by using a roll coater or the like, with strong shearing force application to improve the surface smoothness and transparency, the coating method was limited, and post-treatments such as buff polishing and specular hot pressing had to be carried out additionally after coating. Additionally, although these methods were effective for flat articles such as plate-like or film-like articles, in the case of molded bodies having concave and convex parts, curved faces, or complicated three-dimensional shapes such as container-like shapes, coating by a roll coater while applying shearing force or post-treatment by buff polishing or the like was difficult was difficult or impossible. Consequently, no antistatic molded body excellent in transparency, surface smoothness, and durability has been made available so far.

Among the objects of the present invention are to provide an antistatic coating material excellent in transparency, surface smoothness, and antistatic property, easy to be applied, and unnecessary to be post-treated.

Applicants have found that there are 2 reasons why in the case of applying a coating material containing conductive metal oxide fine particles dispersed therein, particularly by a spray method, it is generally difficult to obtain a transparent coating with smooth surface.

The first reason is that the particle diameter of the agglomerates of the conductive metal oxide fine particles is large. The conductive metal oxide fine particles with an average particle diameter of primary particles of several ten nm are used for a transparent antistatic coating material; however, it is very difficult to disperse the above-mentioned conductive metal oxide fine particles in a primary particle state, and in general, the particles exist in the form of agglomerates formed by agglomeration of a large number of primary particles. If the particle diameter of the above-mentioned agglomerates is large, since light scattering is increased and the coating surface becomes concave and convex, it is impossible to obtain a transparent and smooth coating. Furthermore, in the case of spray coating, splashes are brought into contact fiercely with air while flying through the air, and the coating material is deprived of the evaporation latent heat and absorbs moisture; attributed to that, further larger agglomerates of the conductive metal oxide fine particles are produced, and accordingly the transparency and smoothness of the coating tend to be deteriorated.

The second reason is because the sprayed splashes are adhered on the substrate surface and dried and solidified before being sufficiently leveled, and therefore concave and convex traces of the splashes are left on the coating surface. It occurs commonly in spray coating that the traces of splashes are easy to remain on the coating surface; however, the tendency is significant in the case of the antistatic coating material containing a large quantity of the

conductive metal oxide fine particles. The reason for that is thought to be because the coating material has a thixotropic property.

To deal with that problem, in the present invention, the solid matter concentration in the antistatic coating material is suppressed to a low value. Furthermore, the conductive metal oxide fine particles are dispersed in such a manner in the antistatic coating material that the average particle diameter thereof is 100 nm or smaller, and the content of particles with particle diameter of 200 nm or larger is 10% by weight or less. By using the antistatic coating material of the present invention, an antistatic layer with excellent transparency and surface smoothness can be formed on a substrate by simply spray coating, without requiring post-treatment.

To achieve a finely dispersed of conductive metal oxide fine particles, of course, using smaller particles is necessary; however, this is insufficient by itself.

Please see Example 1 and Comparative Examples 1 and 3 of the specification, the results of which are summarized in the Table below.

Table

			Example 1	Comparative Example 1	Comparative Example 3
Solid matter concentration (in coating material)		wt.%	10	10	10
Tin oxide content (in solid matters)		wt.%	62	62	62
Tin oxide dispersion state	average particle diameter	nm	90	180	180
	content of particles with particle diameter of 200 nm or larger	wt.%	7	35	35
Viscosity of antistatic coating material		cps	25	22	22
Performance of buff finishing			none	done	none
Evaluation results	surface resistivity	$\times 10^{8}\Omega/\square$	20~80	3~6	3~6
	surface roughness (Ra)	nm	35	5	65
	haze value	%	5	4	28
	total light transmittance	%	88	87	84

Example 1 and Comparative Examples 1 and 3 used the same antimony-doped tin oxide powder (trademark: T®1; manufactured by Mitsubishi Materials Corporation; primary particle diameter 20 nm). However, the dispersion states of the tin oxide powder were quite different. In Example 1, the antistatic layer with excellent transparency and surface smoothness can be formed on a substrate by simply spray coating without requiring post-treatment. In contrast, in Comparative Example 3, the antistatic layer does not have excellent transparency and surface smoothness, and in Comparative Example 1, post-treatment (buff finishing) is necessary to achieve good results.

In Example 1, after the addition of the tin oxide powder, the solution was mixed with a bead mill filled with beads having a diameter of 0.3 mm and made of zirconia, under a mixing

condition of 2300rpm, for 4 hours. On the other hand, the stirring time at a rotation speed of 2300rpm was shortened to 30 minutes in Comparative Examples 1 and 3.

From these results, it is clear that a special mixing condition is necessary to achieve the finely dispersed conductive metal oxide fine particles of the present invention.

The Ito reference discloses an antistatic coating material with the use of conductive metal oxide particles in conjunction with a binder resin with an organic solvent of ethyl acetate. The '226 reference discloses a content of tin oxide electroconductive fine powder preferably between 45 - 80% by weight, with a particle size of 20nm.

However, neither the Ito reference nor the and '226 reference disclose the dispersion state of the conductive metal oxide fine particle. Indeed, these references used smaller particles. But, as described above, only this feature alone is insufficient. A special mixing condition is necessary to achieve the finely dispersed conductive metal oxide fine particles of the present invention. Neither the Ito reference nor the '226 reference disclose a method to avoid the particles existing in the form of agglomerates formed by the agglomeration of a large number of primary particles. With the antistatic coating material of either of the Ito or '226 reference, an antistatic layer with excellent transparency and surface smoothness can not be formed on a substrate by simply spray coating without requiring post-treatment. In this regard, it is noted that the '226 reference indicates buff finishing is necessary, as in the case of Comparative Example 1 noted above.

In view of the above, reconsideration and allowance of now pending claims 8 - 10 and 21 - 23 of this application are now believed to be in order, and such actions are hereby earnestly solicited.

If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned attorney at the local Washington, D.C. telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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